

containing a compound of formula (1), a condensation product thereof or a resin produced from the compound, and an acid and/or acid generator, and the compound, the condensation product thereof or the resin produced from the compound is contained in an amount of 50 mass% or more in a solid content of the composition for forming anti-reflective coating.

Claim 1 further specifies that in the formula (1), R_1 and R_2 are independently of each other hydrogen atom or an alkyl group, and R_3 and R_4 are independently of each other hydrogen atom, methyl group, ethyl group, hydroxymethyl group or an alkoxymethyl group. Such a composition for forming an anti-reflective coating is not taught or suggested by the cited references.

As a result of the compound being contained in an amount of 50% mass percent or more, the claimed composition provides superior dry etching rate selection ratio to photoresist of 1.4 to 2.7. See Example 1 to 9 of the specification, as filed. In contrast, the cited references fail to teach or suggest such a dry etching rate selection ratio of 1.4 to 2.7, and fail to teach or suggest the claimed composition.

B. The References Do Not Teach or Suggest
the Claimed Etching Rate Selection Ratio

Kang is directed toward a radiation absorbing polymer, wherein crosslinking agents are added for increased crosslinking density. Kang contains a urea crosslinking component in an amount of only 16.4 weight percent of the solid content. The composition disclosed in Kang corresponds to Comparative Example 1 of the present specification. Comparative Example 1 is an antireflective coating forming composition comprising 2 grams of a novalac resin containing light absorbing group (anthracene) and 0.53 grams of hexamethoxymethylmelamine that exhibits a dry etching rate selection ratio to photoresist of only 0.88. Kang nowhere discloses a dry etching rate of 1.4 to 2.7.

Mizutani discloses a resist composition for an electron beam, UEV or x-ray containing an acid generator. In Mizutani, the crosslinking agent (i.e., alkyl methylated glycoluril) is present in an amount of 13.7% weight of the solid content. See Mizutani, Examples 201 and 217. Mizutani thus corresponds to Comparative Example 2 of the present specification, which exhibits a dry etching rate selection ratio to photoresist of only 1.3. Nowhere does Mizutani suggest a relation to an antireflective coating forming composition; nor does Mizutani disclose a dry etching rate selection ratio of 1.4 to 2.7.

Both Bonk references fail to disclose an antireflective coating for a semiconductor as claimed. Moreover, there is no indication that either Bonk reference discloses, inherently or expressly, the improved dry etching rate selection ratio of 1.4 to 2.7.

Thus, none of Kang, Mizutani or Bonk provides sufficient dry etching selection ratio as compared with exemplary embodiments of the claimed invention. Further, neither Mizutani nor Kang use urea components as cross-linking agents for polymers, such as is done in the claimed invention. Thus, it would not have been obvious to have combined Kang, Mizutani and/or Bonk, because having combined these references would not have obtained the claimed invention.

C. The References Do Not Teach or Suggest the Claimed
50 Mass% or More Content of the Recited Compound

Still further, claim 1 specifically requires that the compound of formula (1), a condensation product thereof or a resin produced from the compound, is contained in an amount of 50 mass% or more in a solid content of the composition for forming anti-reflective coating. However, the cited references also do not teach or suggest this feature.

The combination of references cited in the Office Action is directed to a combination of a resin and a cross-linking agent. However, the claimed invention uses, as a main component of the composition, a compound that is more comparable to the cross-linking

agent of the cited references. That is, whereas the cited references at most would utilize a resin as a main component and a cross-linking agent as a minor component, the compound of the claimed composition that is contained in an amount of 50 mass% or more in a solid content of the composition is more comparable to the cross-linking agent of the cited references.

As is well known in the art, cross-linking agents are generally used in very low amounts as compared to the higher amounts of resins as a main component. Nowhere does any of the cited references, alone or in combination, teach or suggest that the disclosed cross-linking agents could or should be used in an amount of 50 mass% or more in a solid content of the composition, which content would necessarily be in excess of the content of the resin component itself that is to be cross-linked by that cross-linking agent. This would require modifying the cited references to use opposite amounts of the materials -- that is, a major amount of cross-linking agent and a minor amount of resin.

It would not have been obvious to one of ordinary skill in the art that superior dry etching rates could or should be provided by utilizing, as a main component of the composition, a compound that is otherwise known as a cross-linking agent. Such modifications, and results, of a modification of the cited reference would not have been obvious, and thus the cited references would not have rendered obvious the claimed invention.

D. Conclusion


For at least the foregoing reasons, instant claims 1, 4-8, 10 and 11 would not have been obvious in view of Kang, Mizutani and Bonk. Reconsideration and withdrawal of the rejection are earnestly solicited.

II. Conclusion

In view of the foregoing remarks, Applicants respectfully submit that the application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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